Amendments to the Specification:

Please replace entire abstract with the following new paragraph:

~~Methods and apparatuses for calculating a scale relationship of an imaging system are disclosed.~~ The disclosed methods and apparatuses leverage a known value of a characteristic of an object to partially calibrate an imaging system "on-the-fly", and minimize, if not eliminate, the need for a separate calibration image(s) ~~and/or object(s)~~. Specifically, the ~~characteristic is found and measured in an image to provide a measured value; and the~~ scale relationship (i.e. the relationship between physical dimensions and image dimensions) is calculated using the known value and a measured value ~~and the known value~~ of the characteristic from the image. The same image used to calculate the scale relationship is also processed, such as inspected, ~~where processing includes,~~ for example ~~inspection~~. The known value can be a measurement of an aspect of many things, including an inherent feature, ~~and/or boundary thereof, whether it is rotationally or non-rotationally symmetric, an added feature and/or boundary thereof, such as a fiducial,~~ or a relationship between features, for example. One embodiment uses a model to find the characteristic. A described preferred embodiment ~~is described that~~ inspects an end-face of a fiber-optic cable, wherein the known value is the diameter of an annular cladding of the fiber-optic cable.

Amendments to the Claims:

This listing of claims will replace all prior versions, and listing, of claims in the application:

Listing of Claims:

Claim 1 (currently amended): A method for calculating a scale relationship for an imaging system, the method comprising:

(a) selecting a characteristic having a known value, the characteristic to be measured in an image, and the characteristic associated with an object;

(b) acquiring, using the imaging system, ~~an~~the image of at least a portion of the characteristic of the object;

(c) finding and measuring the characteristic in the image to provide the measured value;

(d) calculating a scale relationship between the object and the image, using the measured value and the known value; and

(e) processing the image using the scale relationship.

Claim 2 (original): The method of claim 1,wherein the object is a fiber-optic end-face, and wherein selecting the characteristic further includes:

selecting, as the characteristic, a diameter of a substantially annular cladding of the fiber-optic end-face.

Claim 3 (original): The method of claim 1, wherein selecting the characteristic further includes:

selecting, as the characteristic, an aspect of a feature of the object, and

wherein finding and measuring further includes:

finding the feature in the image and measuring the aspect of the feature to provide the measured value.

Claim 4 (original): The method of claim 1, wherein finding and measuring further includes:

generating at least one model of at least part of the object, the model including the characteristic;

searching the image to find a best match to the at least one model; and

measuring the characteristic of the best match to provide the measured value.

Claim 5 (original): The method of claim 1, wherein finding and measuring further includes:

finding the characteristic in the image and measuring an aspect of the characteristic in the image to provide the measured value.

Claim 6 (original): The method of claim 1, wherein processing further includes:

processing more than one image using the scale relationship.

Claim 7 (original): The method of claim 1, wherein the characteristic associated with the object is associated with each object of a plurality of objects, the method further comprising:

(f) repeating (b) – (e) with each of the plurality of the objects.

Claim 8 (currently amended): An apparatus for calculating a scale relationship for an imaging system, the apparatus comprising:

an object having a characteristic with a known value, the characteristic to be measured in an image;

thean image of at least a portion of the characteristic,

the image being acquired by the imaging system;

finding means adapted to find the characteristic in the image;

measuring means, in cooperation with the finding means, adapted to measure the characteristic in the image to provide a measured value;

scale means, in cooperation with the measuring means, adapted to determine a scale relationship between the image and the object, using the measured value and the known value; and

processing means, in cooperation with the scale means, adapted to process the image using the scale relationship.

Claim 9 (currently amended): The apparatus of claim ~~1~~8, wherein the object is a fiber-optic end-face, and wherein the characteristic is a diameter of a substantially annular cladding of the fiber-optic end-face.

Claim 10 (currently amended): The apparatus of claim ~~1~~8, wherein the finding means further includes:

modeling means, adapted to generate at least one model of at least part of the object, the at least one model including the characteristic; and

searching means, in cooperation with the modeling means, adapted to search the image to find a best match to the at least one model, and

wherein the measuring means is further adapted to measure the characteristic of the best match to provide the measured value.

Claim 11 (currently amended): The apparatus of claim ~~1~~8, wherein the characteristic is

an aspect of a feature of the object, and

wherein the finding means is further adapted to find the feature, and

wherein the measuring means is further adapted to measure the aspect of the feature to provide the measured value.

Claim 12 (currently amended): The apparatus of claim ~~1~~8, wherein processing means is further adapted to process a plurality of images using the scale relationship, the apparatus further comprising:

a plurality of objects; and

acquiring means, in cooperation with the imaging system, adapted to acquire the plurality of images of the plurality of objects, respectively.

Claim 13 (currently amended): A method for calculating a scale relationship for an imaging system, the method comprising:

(a) selecting a characteristic having an aspect with a known value, the aspect to be measured in an image, and the characteristic being associated with an object;

(b) acquiring, using the imaging system, the~~an~~ image of at least a portion of the characteristic of the object;

(c) finding the characteristic in the image and measuring the aspect of the characteristic in the image to provide a measured value;

(d) calculating the scale relationship for the imaging system, using the measured value and the known value; and

(e) inspecting the object in the image using the scale relationship.

Claim 14 (original): The method of claim 13, wherein the object is an end-face of a fiber-optic cable, and wherein inspecting further includes:
finding potential defects in the image of the end-face;
measuring the potential defects in the image of the end-face; and
calculating a physical size of the potential defects using the scale relationship.

Claim 15 (original): The method of claim 14, wherein selecting the characteristic further includes:
selecting, as the characteristic, a diameter of an annular cladding of the end-face of the fiber-optic cable.

Claim 16 (original): The method of claim 15, wherein finding the characteristic in the image and measuring further includes:
generating at least one model of the annular cladding of the end-face of the fiber-optic cable;
finding in the image a best match to the at least one model; and
measuring the diameter of the best match to provide the measured value.

Claim 17 (original): The method of claim 16, wherein generating the at least one model, further includes:
generating, as the at least one model, at least one scale-invariant model.

Claim 18 (original): The method of claim 14, wherein selecting the characteristic further includes:
selecting, as the characteristic, a diameter of a stress rod of the end-face of the fiber-optic cable.

Claim 19 (original): The method of claim 13, wherein the characteristic

associated with the object is associated with each object of a plurality of the objects, the method further comprising:

(f) repeating (b) – (e) with each of the plurality of objects.

Claim 20 (currently amended): An apparatus for calculating a scale relationship for an imaging system, the apparatus comprising:

a characteristic having an aspect with a known value, the aspect to be measured in an image, and the characteristic being associated with an object;

an image, acquired by the imaging system, of at least a portion of the characteristic of the object,

finding means, adapted to find the characteristic in the image;

measuring means, in cooperation with the finding means, adapted to measure the aspect of the characteristic in the image to provide a measured value;

scale means, in cooperation with the measuring means, adapted to calculate a scale relationship between the image and the object, using the measured value and the known value; and

inspecting means, in cooperation with the scale means, adapted to inspect the object in the image using the scale relationship.

Claim 21 (original): The apparatus of claim 20, wherein the object is an end-face of a fiber-optic cable, and wherein inspecting means further includes:

defect means, adapted to find potential defects in the image of the end-face;

defect-measuring means, in cooperation with the defect means, adapted to measure the potential defects in the image of the end-face; and

size means, in cooperation with the defect-measuring means and the scale means, adapted to calculate a physical size of the potential defects using the scale relationship.

Claim 22 (original): The apparatus of claim 21, wherein the characteristic is a diameter of an annular cladding of the end-face of the fiber-optic cable.

Claim 23 (original): The apparatus of claim 22, wherein the finding means further includes:

modeling means, adapted to generate at least one model of the annular cladding;

searching means, in cooperation with the modeling means, adapted to search the image to find a best match to the at least one model; and

wherein the measuring means is further adapted to measure the diameter of the best match to provide the measured value.

Claim 24 (original): The apparatus of claim 23, wherein the modeling means is further adapted to generate at least one scale-invariant model.

Claim 25 (original): The method of claim 21, wherein the characteristic is a diameter of a stress rod of the end-face of the fiber-optic cable.

Claim 26 (currently amended): The apparatus of claim 20, further comprising:

a plurality of objects, each object of the plurality of objects associated with the characteristic; and

the plurality of images~~acquiring means, in cooperation~~

~~with~~ acquired by the imaging system, ~~adapted to acquire an image~~ of at least a portion of the characteristic for each object of the plurality of objects~~, so as to provide the plurality of images~~, and

wherein the finding means is further adapted to find the characteristic in each of the plurality of images,

wherein the measuring means is further adapted to measure within each of the plurality of images, the characteristic, so as to provide a plurality of measured values,

wherein the scale means is further adapted to calculate a scale relationship between each of the plurality of objects and each of the plurality of images using the known value and the respective measured value of the plurality of measured values, so as to provide the plurality of scale relationships, and

wherein the inspection means is further adapted to inspect each of the plurality of images using the respective scale relationship of the plurality of scale relationships.

Claim 27 (currently amended): A method for calculating a scale relationship for an imaging system, the method comprising:

selecting a characteristic having a known value, the characteristic to be measured in an image, and being associated with each object of a plurality of objects;

acquiring, with the imaging system, the~~an~~ image of at least a portion of the characteristic for each

object of the plurality of objects, so as to provide a plurality of images;

finding the characteristic in each of the plurality of images;

measuring, within each of the plurality of images, the characteristic, so as to provide a plurality of measured values;

calculating a scale relationship between each of the plurality of objects and each of the plurality of images using the known value and the respective measured value of the plurality of measured values, so as to provide the plurality of scale relationships; and

processing each of the plurality of images using the respective scale relationship of the plurality of scale relationships.

Claim 28 (original): The method of claim 27, wherein finding the characteristic in the image further includes:

generating at least one model of at least part of the object, the model including the characteristic; and

searching the image to find a best match to the at least one model, and

wherein measuring the characteristic further includes:

measuring the characteristic of the best match to provide the measured value.

Claim 29 (original): The method of claim 27, wherein the object is a fiber-optic end-face, and selecting the characteristic further includes:

selecting, as the characteristic, a diameter of a

substantially annular cladding of the fiber-optic end-face.

Claim 30 (currently amended): The method of claim 27, wherein processing the image further includes:

inspecting the image using the respective scale relationship.

Claim 31 (currently amended): A method for, at least partially, calibrating an imaging system, the method comprising:

(a) selecting a characteristic having a known value, the characteristic to be measured in an image, and being associated with each of a plurality of objects;

(b) acquiring, using the imaging system, thean image of at least a portion of the characteristic of onean object of the plurality of objects;

(c) finding the characteristic in the image and measuring the characteristic in the image to provide a measured value;

(d) calibrating, at least partially, the imaging system by calculating a scale relationship between the image and the object, using the measured value and the known value; and

(e) processing the image using the scale relationship.

Claim 32 (original): The method of claim 30, further comprising:

(f) repeating (b) – (e) with each of the plurality of objects.

Claim 33 (new): The method of claim 1, wherein the characteristic is a fiducial.

Claim 34 (new): The method of claim 33, wherein the fiducial is a grid

of dots.

Claim 35 (new): The method of claim 1, wherein the characteristic is a relationship between features of the object.

Claim 36 (new): The method of claim 35, wherein the characteristic is a distance between two fiducials on the object.

Claim 37 (new): The method of claim 4, wherein generating the at least one model, further includes:

generating, as the at least one model, at least one scale-invariant model.

Claim 38 (new): The apparatus of claim 8, wherein the characteristic is a fiducial.

Claim 39 (new): The apparatus of claim 8, wherein the characteristic is a relationship between features of the object.

Claim 40 (new): The apparatus of claim 39, wherein the features are dots within a grid of dots.

REMARKS

This is in response to the Office action dated 07/23/2003 objecting to the abstract, the drawings, and claims 9 –12, and rejecting claims 1- 32. More specifically, the Office action rejected claims 1, 3 – 8, 10 -13, 19, 20, 26 – 28, and 30 – 32 under 35 USC 102(b) as being unpatentable over Hoshiyama US Patent No. 5, 812,265, and rejecting claims 2, 9, 14 – 18, 21 – 25, and 29 under 35 USC 103 as being unpatentable over Hoshiyama in view of Dar et al. US Patent No 5,995,212.

In response to the objection to the abstract, a substitute abstract is submitted with this amendment that is under 150 words and deletes the statement to which the Office action objected. Therefore, the Applicant believes the objection to the abstract, and thus, the specification, to be overcome.

In response to the objection to the drawings, new corrected drawings are submitted in this application that are not hand-drawn, as requested by the Office action. Therefore, the Applicant believes the objections to the drawings to be overcome.

In response to the objection to claims 9 – 12, the dependency was corrected to be to claim 8 and not claim 1, as requested by the Office action. Therefore, the Applicant believes the objections to the claims to be overcome.

With regard to the rejections, first the Office action rejected claims 1, 3 – 8, 10 -13, 19, 20, 26 – 28, and 30 – 32 under 35 USC 102(b) as being unpatentable over Hoshiyama US Patent No. 5, 812,265.

With regard to Hoshiyama, Hoshiyama discloses a method for calculating the dimensions of an article, by using a interesting physical set-up whereby, the article to be measured is positioned on one plane, and a scale plate, i.e. a calibration plate, is positioned on another plane under or over the article. Then, the article is imaged by the CCD separately from the scale plate, see Hoshiyama, abstract, lines 6 – 7 and col. 4, lines 37 - 41. Because of the relative positioning between the two, i.e. the article and the scale plate, the article can be measured using the marks on the scale plate, where the dimensions of the marks on the scale plate are known.

With regard to amended claim 1, amended claim 1 calculates a scale relationship for an imaging system by imaging a characteristic with a known value and measuring the

same characteristic in the image to provide a measured value, where the scale relationship is calculated from the known value and the measured value. Claim 1 was amended to further clarify, what was already inherently claimed, that the characteristic having the known value, and that is to be measured, is in the image.

Comparing amended claim 1 to Hoshiyama, in amended claim 1, the characteristic has a known value. In Hoshiyama, the marks on the scale plate have a known value. Therefore, for arguments sake, the marks of Hoshiyama are equated with the characteristic of amended claim 1. However, the marks of Hoshiyama are not being measured. Instead, an item having an unknown value, the aperture, is the thing that is being measured in Hoshiyama. In claim 1, the item having the known value is also the item being measured in the image. Contrastingly, in Hoshiyama, the item having the known value is not the same item being measured.

In summary, Hoshiyama does not have a characteristic with a known value that is also measured. It does not have an element like the characteristic limitation of claim 1. In view of the above, Applicants' claim 1, as amended is not anticipated by Hoshiyama. Therefore, for the foregoing reason alone, the rejection of claim 1 under 35 USC 102 as being anticipated by Hoshiyama is deemed to be overcome.

A further difference is that the item being measured in the image of Hoshiyama, i.e. the aperture, is not within the same image as the item having the known value, i.e. the marks. Contrastingly, in amended claim 1, the item being measured in the image, i.e. the characteristic, is within the same image as the item having the known value. In fact it is the same thing.

Thus, not only does Hoshiyama lack the characteristic of amended claim 1, i.e. a single characteristic that is known and measured in an image, Hoshiyama also does not place the item being measured in the same image as the known item. Therefore for this additional reason, amended claim 1 is not anticipated by Hoshiyama and the rejection of claim 1 under 35 USC 102 as being anticipated by Hoshiyama is deemed to be overcome.

Independent amended claim 8 recites an analogous apparatus to claim 1 and was amended also to further clarify the characteristic. Also, independent amended claims 27 and 30 recite a method having the same limitation, .i .e. the characteristic is both known and measured in an image, and were also amended to further clarify the characteristic.

Therefore for the same reasons given above, Hoshiyama does not anticipate amended claims 8, 27 and 30, and thus, the rejection to amended claims 8, 27 and 30 under 102(a) as being unpatentable over Hoshiyama are deemed to be overcome.

Independent amended claims 13 and 20 recite a similar limitation, wherein an aspect of the characteristic is both known and measured in an image and were also amended to further clarify the characteristic. Therefore for analogous reasons to those given above, Hoshiyama does not anticipate amended claims 13 and 20, and thus, the rejection to amended claims 13 and 20 under 102(a) as being unpatentable over Hoshiyama are deemed to be overcome.

With regard to claims 2 – 7, 10 – 12, 19, 26, 28 – 30, and 32, they depend from claims 1, 8, 13, 20, 27 and 31, respectively, and therefore are likewise not anticipated by Hoshiyama. Therefore, the rejections to dependent claims 2 – 7, 10 – 12, 19, 26, 28 – 30, and 32 under 102(b) as being unpatentable over Hoshiyama are deemed to be overcome.

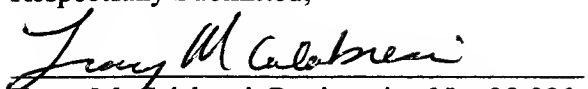
Second, the Office action rejected claims 2, 9, 14 – 18, 21 – 25, and 29 under 35 USC 103 as being unpatentable over Hoshiyama in view of Dar, et al. US Patent No 5,995,212. With regard to claims 2, 9, 14 – 18, 21 – 25, and 29 under 35, they depend from claims 1, 8, 13, 20, and 27, respectively, each of which is deemed allowable under 35 USC 103 over Hoshiyama in view of Dar. Thus, the rejections to dependent claims 2, 9, 14 – 18, 21 – 25, and 29 under 35 under 103 over Hoshiyama in view of Dar is deemed to be overcome.

New claims 33 - 40 do not add new matter, see specification page 10, paragraph 52 for one reference where the characteristic is a fiducial or a relationship between more than one feature, for example, and see specification page 12, paragraph 63 for one reference to a scale-invariant model. Furthermore, the new claims depend from the claims 1, and 8, which claims Applicant deems allowable. Thus, Applicant contends that new claims 33 - 40 are also allowable.

Other amendments not expressly mentioned above, were made to correct informalities and not in response to the Office Action.

Accordingly, Applicant respectfully requests entry of the above amendment, and respectfully requests allowance of claims 1 - 40. The Examiner is invited to telephone the undersigned attorney to further the prosecution of this application.

Respectfully Submitted,



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